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Bruce:

This letter documents the results of the ground examination we conducted on May 1, 2007 with Frank Lafferty, Forest Crew Member. The purpose of this examination was to determine the current status of the Douglas-fir tussock moth (DFTM) in Santa Clara Canyon. As you recall, this ground examination was initiated because of the DFTM egg masses Dave Conklin, Forest Pathologist of our staff, found while assisting you putting out MCH bubble caps to protect the Douglas-fir trees from Douglas-fir beetle attacks. The egg masses he brought back to the office were very robust. Most if not all the eggs hatched two weeks later after being kept at room temperature. Following is a brief summary of the results of our ground examination:

Although no DFTM defoliation was detected in 2006 (refer to our 3410 letter dated December 12, 2006) our ground examination revealed both light defoliation and an abundance of DFTM egg masses (Figure 1) and pupal cases (Figure 2) on the Douglas-firs and white firs, the preferred hosts of the DFTM.

Figure 1. DFTM egg masses and cocoons on white fir, Santa Clara Canyon, 2007

The egg masses and pupal cases were also abundant on the walls and eves of the structures examined at the fire station site (Figures 2 and 3).

Figures 2 and 3. DFTM pupal cases on the walls and under the eves at the Fire Stations site

Because of the numerous egg masses observed on the mixed conifer in Santa Clara Canyon we believe the tussock moth will increase to outbreak levels causing moderate to heavy defoliation in parts of Santa Clara Canyon over the summer. This pending outbreak appears to be similar to the 1976 outbreak that occurred on forested land in Los Alamos and Pueblo Canyons, which dissect the town site area of Los Alamos. Defoliation was light in 1976 and numerous egg masses were found on the above mentioned forested lands. By 1977, moderate to complete defoliation occurred on 600 acres of mixed conifer type in these canyons.

DFTM outbreaks have a pattern that can be separated in to four phases: a release phase in which tussock moth populations rapidly increase to outbreak numbers; a peak phase when insect densities reach their maximum; a decline phase when populations begin a rapid decrease; and a post decline phase when populations reach their lowest level. Each phase generally lasts a year and is defined by population level, defoliation intensity, and within generation survival rates. Based on the numbers of egg mass observed, the tussock moth in Santa Clara Canyon appears to be either at or nearing the release phase of the outbreak cycle described above. The best time to initiate treatment strategies for

DFTM is prior to the occurrence of significant defoliation as in the case in Santa Clara Canyon. After the first year of moderate to heavy defoliation, large scale treatments may not be an option due to the advanced stage of the outbreak.

Because the proposed treatment area is along Santa Clara Creek and the ponds, treatment options are likely limited to microbial controls such as TM-Biocontrol and B.t.k. TM-Biocontrol is a nucleopolyhedrosis virus (NPV). The NPV used in TM-Biocontrol occurs naturally in the soil in areas affected by tussock moth outbreaks. NPV is highly specific to tussock moths. B.t.k. on the other hand, is an aerobic spore forming bacterium that produces a diamond shaped proteinaceous crystalline inclusion that damages the midgut cells of tussock moths after ingestion. Once ingested, B.t.k. causes almost immediate cessation of feeding. B.t.k., unlike TM-Biocontrol, affects the larvae of many species of moths and butterflies.

The DFTM has one generation per year. The insect overwinters in egg masses that contain 150-250 eggs. Egg masses are commonly found on the undersides of small branches. Egg masses are distributed throughout the foliar crown, but are concentrated in the upper crown, and may be found on the trunk, nearby structures, and other vegetation, etc.

Eggs hatch in late spring, and leave the egg mass when shoot elongation is about 50% completed. Larval feeding occurs when it is too late in the season for a tree to respond with latent bud development, so when significant defoliation occurs, the tree cannot initiate new buds to replace the lost foliage next spring. Small larvae produce silk strands for wind dispersal through the forest. First and second instar larvae feed exclusively on the undersides of the soft, new foliage. This feeding kills the foliage, which turns red, but may persist on the tree throughout the summer giving affected areas a reddish cast. When at high densities, new foliage may be consumed in 2-3 weeks forcing the larvae to feed on the older foliage. Later instar larvae can completely strip all needles from trees if larval densities are extremely high.

Larval feeding lasts approximately 60 days (June and July), and then pupation occurs (late July through August). Larvae spin cocoons in the foliated portions of the crown, in bark crevices, and on twigs in the lower crown. Moths emerge approximately 2 weeks after pupating. The female moth is wingless and stays on her cocoon where she emits a pheromone attracting male moths. Having mated, the female lays her eggs, completing the yearly cycle.

Many natural agents exist that keep tussock moth populations at low levels most of the time. These include small wasps that parasitize the eggs and pupae, flies that parasitize the larval stage, and birds and other predators that destroy large numbers of larvae, pupae, and egg masses. In a recent outbreak in the Sandia Mountains, a naturally occurring virus did contribute to the population collapse; however, considerable tree mortality occurred before caterpillar populations succumbed.

If you have any questions concerning this evaluation or need additional information, please call me at 505.842.3287 or e-mail me at trogers@fs.fed.us.

Sincerely,

*/s/ Terrence J. Rogers*
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